CSCI 340 – Homework 2

Dr. Schwartz

- 1. If the only difference between L and L^* is the word λ , is the only difference between L^2 and L^* the word λ ? (L^2 is the language LL L concatenated with itself).
- 2. For each of the problems below, give a regular expression which only accepts the following. Assume $\Sigma = \{a \ b\}$
 - (a) All strings that begin and end with the same letter
 - (b) All strings in which the total number of *a*'s is divisible by 3
 - (c) All strings that end in a double letter
- 3. Show the following pairs of regular expressions define the same language
 - (a) $((\mathbf{a} + \mathbf{b}\mathbf{b})^*\mathbf{a}\mathbf{a})^*$ and $\lambda + (\mathbf{a} + \mathbf{b}\mathbf{b})^*\mathbf{a}\mathbf{a}$
 - (b) $(ab)^*a$ and $a(ba)^*$
 - (c) $(a^*bbb)^*a^*$ and $a^*(bbba^*)^*$
- 4. Describe (in English phrases) the languages associated with the following regular expressions
 - (a) $(\mathbf{a} + \mathbf{b})^* \mathbf{a} (\lambda + \mathbf{b} \mathbf{b} \mathbf{b} \mathbf{b})$
 - (b) $(a(aa)^*b(bb)^*)^*$
 - (c) $((a + b)a)^*$